

# IUSE PROGRAM



**Improving the quality and effectiveness of the education of undergraduates in all of the STEM fields**

## IMPROVING UNDERGRADUATE STEM EDUCATION

The goal of the IUSE Program is to catalyze colleges and universities and their faculties to provide highly effective, evidence-based teaching and learning experiences for their undergraduate students taking STEM courses. It supports the development and use of practices that are rooted in a solid research base. In pursuit of this goal, IUSE supports a broad range of projects on two tracks. The Engaged Student Learning track supports the development, use, and testing of instructional practices and curricular innovation that engage and improve student learning and retention in STEM. The Institutional and Community Transformation track supports efforts to increase the propagation of highly effective, evidence-based teaching and learning by promoting this activity broadly at the discipline, academic department, and institutional levels.

IUSE invites proposals that address immediate challenges and opportunities that are facing undergraduate STEM education, as well as those that anticipate new structures and new functions of the undergraduate learning and teaching enterprise. Principal Investigators are encouraged to consider the value of the project from the perspective of the end users, as well as the relationships, partners, and structures which would eventually be needed to sustain the improvement on a wide scale.

### Track 1: Engaged Student Learning

This track focuses on design, development, and research studies that involve the creation, exploration, or implementation of tools, resources, and models that show particular promise to increase engagement of undergraduate students in their STEM learning and lead to measurable and lasting learning gains. Projects are encouraged to form collaborations among STEM disciplinary researchers, education researchers, and cognitive scientists so that their projects can best leverage what is known about how people learn and/or contribute to the growth of that body of knowledge. The undergraduate audience for IUSE projects includes students from two-year colleges to four-year colleges and universities, both declared and undeclared STEM majors, students whose courses of study require solid skills and knowledge of STEM principles, and students seeking to fulfill a general education requirement in STEM.

#### Exploration Projects:

\$250,000 max, up to 2 years

#### Design & Development I Projects:

\$600,000 max, up to 3 years

#### Design & Development II Projects:

\$601,000 to \$2,000,000, up to 5 years

### Track 2: Institutional and Community Transformation

This track supports projects that use innovative approaches to substantially increase the propagation of highly effective methods of STEM teaching and learning in institutions of higher education. Projects may use technology and distance education methods (or hybrid designs) when supported by evidence of potential effectiveness and are expected to leverage advances in STEM knowledge to motivate student interest. Projects may seek to transform high enrollment, lower division courses or may focus their efforts in multiple courses within a department or a college or in a particular disciplinary area. Faculty learning through continued professional development is also an important consideration for this track. Efforts to promote institutional change will typically require the efforts of teams of faculty members and support from the department chairperson, or college dean. They may also include Provosts and Presidents in the effort to elicit cultural changes required to achieve transformation at the institutional level. Leading members of academic and STEM/STEM education disciplinary professional societies may similarly lead change at the community level.

#### Exploration Projects:

\$250,000 max, up to 2 years

#### Design and Development Projects:

\$3,000,000 max, up to 5 years



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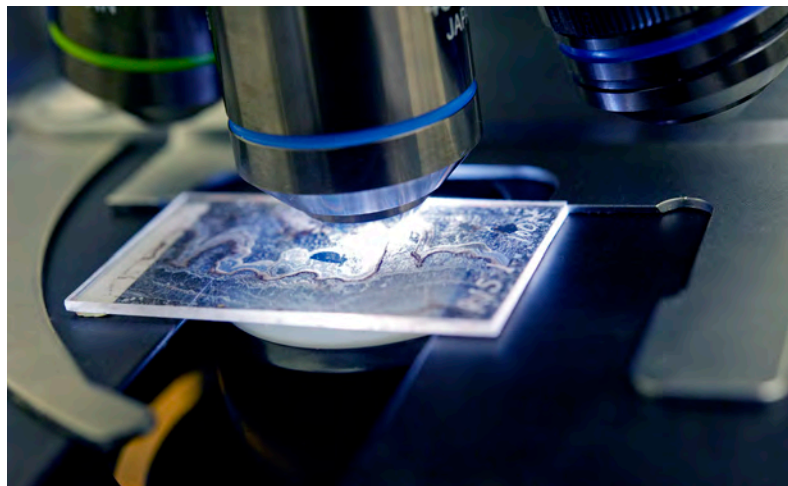
**Project Approach 1: Exploration** Small-scale projects may seek to establish the basis for design and development of new interventions or strategies, develop strategies for the adoption, adaptation, and implementation of effective practices, or adapt and implement strategies shown to be effective at other institutions. They may also pose new interventions or strategies, and explore challenges to their adoption, with the goal of informing policy, practice, and future design or development of components in the STEM higher education enterprise. Results of Exploration projects are expected to be significant enough to contribute to the body of knowledge about STEM teaching and learning and/or effective means to broader implementation.

**Project Approach 2: Design & Development** Larger-scale projects may focus on new or promising interventions or strategies to achieve well-specified STEM learning objectives, including making refinements that build on small-scale testing. The Engaged Student Learning Track has two levels of Design & Development projects. Level I projects focus on achieving propagation beyond a single institution or work to promote change across multiple STEM disciplines within an institution. Level I projects should carry the development to a state in which the evaluation of the project produces evidence to determine whether or not the project's efforts are effective. Level II projects are intended to support large-scale efforts. This level also supports long-term research on efforts to effect change in student learning practices, in order to learn what has been achieved.

Proposals for **Workshops, Conferences, and Special Projects** addressing critical challenges in undergraduate STEM education may be submitted at any time following consultation with a program officer. We welcome small projects, maximum of \$75,000, to explore revolutionary ideas to improve undergraduate STEM education.

Both tracks of the IUSE program support:

- research and development of innovative learning resources;
- design research to understand the impact of such resources;
- strategies to implement effective instruction in a department or departments, within or across institutions;
- faculty development projects;
- design and testing of instruments for measuring student outcomes; and
- proposals for untested and unconventional activities that could have a high impact on learning and contribute to transforming undergraduate STEM education.



For more information and to see abstracts of current awards, please visit:  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=505082](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505082)

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NSF 15-023